Total No. of Questions : 06

Total No. of Pages: 01

M.Pharmacy (Pharmaceutics) (Sem-2) MOLECULAR PHARMACEUTICS (NANO TECH AND TARGETED DDS)

Subject Code : MPH-201 M.Code: 74961

Date of Examination: 05-06-2023

Time: 3 Hrs.

Max. Marks: 75

INSTRUCTIONS TO CANDIDATES :

- Attempt any FIVE questions out of SIX questions.
- Each question carry FIFTEEN marks.
- a) Enumerate the biological process involved in drug targeting to tumor tissues.
 - b) What is Brain specific delivery
- Explain the methods of preparation and evaluation of :
 - a) Liposomes
 - b) Nanoparticles
- 3. Give preparation, evaluation and application of:
 - a) Niosomes
 - b) Monoclonal Antibodies
- Highlight the preparation and evaluation of Pulmonary delivery system 4.
- 5. Write short note on:
 - a) Gene expression systems
 - b) Ex vivo gene therapy
 - c) Cancer
- Highlight the techniques to prepare and evaluate liposomal gene delivery system.

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Total No. of Questions: 06

Total No. of Pages: 01

M.Pharmacy (Pharmaceutics) (Sem.-2) ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS

Subject Code : MPH-202

M.Code: 74962

Time : 3 Hrs.

Date of Examination : 30-05-23

Max. Marks: 75

INSTRUCTIONS TO CANDIDATES :

- Attempt any FIVE questions out of SIX questions. Each question carries FIFTEEN marks.
- a) Discuss the factors influencing dissolution of drugs from dosage forms. Enumerate 1. the approaches employed for enhancing dissolution of drugs from dosage forms
 - Briefly explain the Noyes-Whitney equation and its role in dissolution.
- a) What do you mean by biosimilars? Briefly explain biosimilars and their general compendial requirements.
 - Discuss in detail about pharmaceutical factors that influence oral absorption of drugs with examples.
- a) Write a note on relation between tight junctions and drug absorption. 3.
 - b) Discuss in detail about pharmacodynamics of monoclonal antibodies.
- a) Differentiate between one and two-compartment open pharmacokinetic models. 4. Discuss the pharmacokinetics of a drug administered by IV infusion following one compartment open model.
 - b) Explain MM kinetics and its clinical significance. How is Kmax and Vmax calculated when MM kinetics is operative.
- a) A dose of 300 mg was given to a patient by IV bolus injection. After 30 days the serum drug concentration was, found to be 75 mg/ml. Calculate K and T1/2 of the 5. drag assuming first order kinetics.
 - b) Discuss the IVIVC methods and their requirements.
- a) Give an account of P-glycoprotein pump mediated drug efflux and its inhibition with reference to drug absorption from GIT.
 - b) Discuss pH partition hypothesis with respect to absorption of drugs administered

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 Explain the utility of computers in clinical development. b) Explain computer simulations in whole organism. b) Computational Pleid dynamics Deplain the application of a) Artificial Intelligence ø Total No. of Pages: 62 SellyDra (15) 8 Max. Marks: 75 Enumerate how microcmulsion drug carrier is prepared using computers. COMPUTER AIDED DRUG DELIVERY SYSTEM a) Descriptive verses mechanistic modeling in statistical modeling. M.Pharmacy (Pharmaceutics) (Sem-2) Date of Examination: 02-06-2023 b) Explain the ethics of computing in pharmacousical research. Subject Code: MPH-203 Attempt any FIVE questions out of SIX questions.
 Each question cerries FIFTEEN marks. M.Code: 74963 a) Parameter Sensitivity Analysis Explain modeling techniques for INSTRUCTIONS TO CANDIDATES: Total No. of Questions: 06 a) Intestinal permeation b) Fed vs. Fasted state Write a short note on : Write short note on: c) Risk Assessment c) IVIVC d) BCRP d) ASBT b) P-gp b) QTPP Time: 3 Hrs. 1 1 M. 74763 4 ri

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Total No. of Pages :02 ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS M.Pharmacy (Pharmaceutics) (Sem.~2) Subject Code :MPH-202

M.Code :74962

Date of Examination: 06-07-22

Time : 3 Hrs.

Max. Marks; 75

INSTRUCTIONS TO CANDIDATES:

Attempt any FIVE questions out of SIX questions.

Each question carries FIFTEEN marks.

- A) Discuss different processes of drug absorption from g.i.t. with suitable examples and limitations associate with each of them.
 - B) What is meant by "dissolution rate limited absorption"? Briefly discuss the pharmaceutical factors that need critical consideration for each drugs.
- A) Compare drug absorption from tablet with that from solution of drug. What is relative

ri.

- B) Explain BCS Classification of drugs. Give an account of the approach used forenhancing drug bioxyzilability.
- A) Briefly discuss the compendial dissolution testing methods. Explain the importance of
- B) Discuss the IVIVC methods and their requirements.
- A) What is bioavailability? Discuss the methods used for assenting bioavailability of
- B) Define "bioximilers" with suitable examples. Give an account of their compensing
- Write short notes on:
- A) Tight junctions and their impurance.
 - 10) Drug interactions.
- C) Phermacokinetic-Plaemacodynamic correlation.

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- Write briefly about : é
- A) Non linear pharmacokinetics and its causes.
 - B) Complete moss over design.
- C) Relative and absolute bioavailability.

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Total No. of Questions: 06

ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS M.Pharmacy (Pharmaceutics) (Sem.-2) Subject Code :MPH-202

A) Non-linear pharmacokingues and its causes

6. Write briefly about

Total No. of Pages: 02

C) Relative and absolute boorsalability

B) Complete cross over design.

M.Code :74962

Date of Examination: 06-07-22

Time: 3 Hrs.

Max. Marks: 75

INSTRUCTIONS TO CANDIDATES:

- 1. Attempt any FIVE questions out of SIX questions.
 - Each question carries FIFTEEN marks.
- A) Discuss different processes of drug absorption from g.i.t. with suitable examples and lumitations associate with each of them. 2
- B) What is meant by "dissolution rate imited absorption"? Briefly discuss the pharmaceutical factors that need critical consideration for such drugs.
- A) Compare drug absorption from tablet with that from solution of drug. What is relative becavariability?
- B) Explain BCS Classification of drugs. Give an account of the appearch used furenhancing drug bioavailabiliay.

A) Briefly discuss the compendial dissolution terting methods. Explain the importance of

Biscuss the IVIVC methods and their requirements.

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- At What is housealability? Discuss the methods used for assening bioavailability of
- (i) Defac "bioximian" with suitable wamples. Give an account of floir compendial requirements
- Write short notes on

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- A) Tight practions and their importance.
- b) Drug sateractions.
- C) Praemacokinetic-Pharmacodynamic correlation.

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Total No. of Questions : 06

Total No. of Pages: 01

M.Pharmacy (Pharmaceutics) (Sem.-2)

COSMETIC & COSMECEUTICALS

Subject Code: MPH-204

M.Code: 74964

Date of Examination : 12-07-22

Time : 3 Hrs.

Max. Marks: 75

INSTRUCTIONS TO CANDIDATES :

- Attempt any FIVE questions out of SIX questions.
- Each question carries FIFTEEN marks. 2.
- A) Define a cosmetic product and give an account of the label requirements according to Indian regulations for cosmetics.
 - B) Give an account of the penalties levied for manufacture and sale of spurious and misbranded cosmetics in India
- A) Enumerate nail care cosmetic products. Give an overview of the standards to be maintained for these products.
 - B) Explain the structure of skin and comment on the formulation and action of anti-acne cosmetic products.
- A) Write a note on emollients used in cosmetics giving suitable examples. 3.
 - B) Discuss the formulation of a shampoo and justify the inclusion of various additives in this formulation.
- 4. A) Discuss the key differences in the ingredients used for cold cream and vanishing
 - B) Comment on the causes of bleeding gums and oral cavities. Discuss the cosmeceuticals used for preventing them.
- What are herbal skin care and hair care agents? Give suitable examples and explain the challenges encountered in formulating herbal cosmeceuticals. 5.
- Write notes on (any three):
 - A) Herbal emollients
 - B) Soaps
 - C) Formulations for preventing mouth odour.
 - D) Sun screen agents

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Total No. of Questions : 06

Total No. of Pages: 01

M.Pharmacy (Pharmaceutics) (Sem.-2) COSMETIC & COSMECEUTICALS

Subject Code : MPH-204

M.Code: 74964

Date of Examination : 12-07-22

Time : 3 Hrs.

Max. Marks: 75

INSTRUCTIONS TO CANDIDATES :

- Attempt any FIVE questions out of SIX questions. Each question carries FIFTEEN marks.
- 2.
- A) Define a cosmetic product and give an account of the label requirements according to 1.
 - B) Give an account of the penalties levied for manufacture and sale of spurious and
- A) Enumerate nail care cosmetic products. Give an overview of the standards to be
 - B) Explain the structure of skin and comment on the formulation and action of anti-acne
- A) Write a note on emollients used in cosmetics giving suitable examples. 3.
 - B) Discuss the formulation of a shampoo and justify the inclusion of various additives in
- A) Discuss the key differences in the ingredients used for cold cream and vanishing 4.
 - B) Comment on the causes of bleeding gums and oral cavities. Discuss the cosmeceuticals used for preventing them.
- What are herbal skin care and hair care agents? Give suitable examples and explain the 5. challenges encountered in formulating herbal cosmeceuticals.
- Write notes on (any three) :
 - A) Herbal emollients
 - B) Soaps
 - C) Formulations for preventing mouth odour.
 - D) Sun screen agents

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Total No. of Questions : 06

Total No. of Pages: 01

M.Pharmacy. (Pharmacology/Pharmaceutical Analysis) CLINICAL RESEARCH & PHARMACOVIGILANCE

(Sem.-2)

Subject Code : MPL-204T

M.Code: 74946

Date of Examination : 12-07-22

Time : 3 Hrs.

Max. Marks: 75

INSTRUCTIONS TO CANDIDATES :

- Attempt any FIVE questions out of SIX questions.
- Each question carries FIFTEEN marks.
- A) What is meant by informed consent? Discuss the ethical issues concerning informed
 - B) Give an account of the storage provisions to be provided in a pharmaceutical plant for raw materials and finished products.
- A) Enumerate the different types of personnel required for a clinical trial. Mention their 2.
 - B) Enumerate the different study designs for clinical trials. Describe any one.
- A) Discuss the protocol for conducting a clinical trial. How is clinical study report 3.
 - B) Differentiate between side effect and adverse drug reaction. How is severity and seriousness of ADRs assessed and recorded?
- What are pharmacovigilance studies? Enumerate the approaches used for these studies. 4 Give a detailed account of WHO regulations for this purpose.
- Discuss the regulatory guidelines for ADRs reporting in India. Outline the procedure 5. used for this purpose.
- Write notes on (any three):
 - A) Vaccine safety surveillance
 - B) Pharmacoepidemiology
 - C) Statistical methods for evaluating medication safety data.
 - D) Non RCT and its significance.

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Total No. of Questions : 06

Total No. of Pages: 01

M.Pharmacy (Pharmaceutics) (Sem.-2) MOLECULAR PHARMACEUTICS (NANO TECH AND TARGETED DDS)

Subject Code : MPH-201 M.Code: 74961

Date of Examination : 04-07-22

Time : 3 Hrs.

Max. Marks: 75

INSTRUCTIONS TO CANDIDATES :

- Attempt any FIVE questions out of SIX questions.
- Each question carry FIFTEEN marks.
- a) Discuss the properties of a good polymer conjugate. 1.
 - Discuss the different strategies for enhanced CNS drug delivery.
- a) What are the obstacles in gene delivery? 2.
 - b) Differentiate between dual targeting and combination targeting.
- a) Explain the mechanism of liposome formation.
 - Explain rigidization of fluid phase vesicles with cholesterol.
- a) Discuss the physicochemical aspects of non-ionic surfactant vesicles.
 - b) Explain reverse phase evaporation.
- Discuss components of an aerosols.
 - Explain any one method of production of aerosols.
- 6. a) How characterization of nanoparticles can be carried out?
 - b) Discuss the different polymers used for gene delivery.

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Total No. of Questions : 06

Total No of Pages 01

M.Pharmacy (Pharmaceutics) (Sem.-2) COMPUTER AIDED DRUG DELIVERY SYSTEM

Subject Code : MPH-203 M.Code 74963

Time: 3 Hrs.

Date of Examination : 08-07-22

Max Marks 75

INSTRUCTIONS TO CANDIDATES

- Attempt any FIVE questions out of SIX questions. Each question carries FIFTEEN marks. 2.
- Summarize the history of computers in pharmaceutical research and development (8) Explain regulatory and industrial view on QbD.
- CV Explain BCRP and OCT Transporters. a.
 - 185
 - Give the modeling techniques for drug absorption and solubility. (7)
- a. What is optimization? Explain optimal design with atleast one example. 3. (8)
 - Explain the use of optimization designs in the preparation of microemulsion. b. 175
- Write short note on :
 - In vitro dissolution kinetic models. (5)
 - Fed vs Fasted state (5) b.
 - c. Virtual trial (5)
- Write short note on :
 - a. Artificial Intelligence (8) (7)
 - Robotics h
- (8) Highlight the computer simulations in isolated tissues. 6. 3.
 - Explain the application of IVIVC in availing biowaivers from pharmacokinetics. (7) b.

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Total No. of Questions : 06

Total No. of Pages: 01

Max. Marks: 75

M.Pharmacy (Pharmaceutics) (Sem -2) COSMETIC & COSMECEUTICALS

Subject Code: MPH-204

M.Code : 74964

Time: 3 Hrs.

Date of Examination : 12-07-22

INSTRUCTIONS TO CANDIDATES

Attempt any FIVE questions out of SIX questions.

Each question carries FIFTEEN marks 2.

- A) Define a cosmetic product and give an account of the label requirements according to 1. Indian regulations for cosmetics.
 - B) Give an account of the penalties levied for manufacture and sale of spurious and misbranded cosmetics in India.
- A) Enumerate nail care cosmetic products. Give an overview of the standards to be 2. maintained for these products.
 - Explain the structure of skin and comment on the formulation and action of anti-acne cosmetic products.
- A) Write a note on emollients used in cosmetics giving suitable examples. 3.
 - B) Discuss the formulation of a shampoo and justify the inclusion of various additives in this formulation.
- A) Discuss the key differences in the ingredients used for cold cream and vanishing 4.
 - B) Comment on the causes of bleeding gums and oral cavities. Discuss the cosmeceuticals used for preventing them.
- What are herbal skin care and hair care agents? Give suitable examples and explain the challenges encountered in formulating herbal cosmecenticals. 5.
- Write notes on (any three): 6.
 - A) Herbal emollients

 - C) Formulations for preventing mouth odour.

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M.Pharmacy (Pharmaceutics) (Sem -2)

COSMETIC & COSMECEUTICALS

Subject Code MPH-204 M.Code 74964

Date of Examination 12-07-22

Time : 3 Hrs.

Max Marks 75

INSTRUCTIONS TO CANDIDATES

- Attempt any FIVE questions out of SIX questions Each question carries FIFTEEN marks
- 2-
- Define a cosmetic product and give an account of the label requirements according to Indian regulations for cosmetics.
 - B) Give an account of the penalties levied for manufacture and sale of spurious and misbranded cosmetics in India.
- A) Enumerate nail care cosmetic products. Give an overview of the standards to be 2. maintained for these products.
 - B) Explain the structure of skin and comment on the formulation and action of anti-acne cosmetic products.
- A) Write a note on emollients used in cosmetics giving suitable examples. 3.
 - B) Discuss the formulation of a shampoo and justify the inclusion of various additives in this formulation.
- A) Discuss the key differences in the ingredients used for cold cream and vanishing 4. cream.
 - B) Comment on the causes of bleeding gums and oral cavities. Discuss the cosmeceuticals used for preventing them.
- What are herbal skin care and hair care agents? Give suitable examples and explain the challenges encountered in formulating herbal cosmeceuticals. 5.
- Write notes on (any three): 6.
 - A) Herbal emollients
 - B) Soaps
 - C) Formulations for preventing mouth odour.

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(NANO TECH AND TARGETED DDS) MOLECULAR PHARMAGEUTICS M. Pharmacy (Pharmaceutics) (Sem Date of Examination : 04-07-22 Subject Code: MPH.201 M.Code 74961

Time: 3 Hrs.

Marks Max

INSTRUCTIONS TO CANDIDATES

Attempt any FIVE questions out of SIX questions. Each question carry FIFTEEN marks.

- Discuss the properties of a good polymer conjugate.
- Discuss the different strategies for enhanced CNS drug delivery.
 - What are the obstacles in gene delivery?
- Differentiate between dual targeting and combination targeting.
 - Explain the mechanism of liposome formation. a
- Explain rigidization of fluid phase vesicles with cholesterol.
- Discuss the physicochemical aspects of non-ionic surfactant vesicles. 8 4
- Explain reverse phase evaporation.
- Discuss components of an aerosols, 78 wi
- Explain any one method of production of aerosols. B
- How characterization of nanoparticles can be carried out? TE ø
- Discuss the different polymers used for gene delivery.

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COMPUTER AIDED DRUG DELIVERY SYSTEM M.Pharmacy (Pharmaceutics) (Sem.-2)

Subject Code : MPH-203

Date of Examination : 08-07-22 M.Code : 74963

Time: 3 Hrs.

Max. Marks: 75 NSTRUCTIONS TO CANDIDATES:

Attempt any FIVE questions out of SIX questions.

Each question carries FIFTEEN marks.

Summarize the history of computers in pharmaceutical research and development.(8)

Explain regulatory and industrial view on QbD,

8 Explain BCRP and OCT Transporters.

What is optimization? Explain optimal design with atleast one example. Give the modeling techniques for drug absorption and solubility.

8

Explain the use of optimization designs in the preparation of microemulsion. Write short note on ; -i In vitro dissolution kinetic models. ci

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8 Vartual trad

Write short note on :

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Robotics فعد

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8 Highlight the computer simulations in isolated tissues. ÷

Explain the application of IVIVC in availing biowaivers from pharmacokinetics.

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Roll No. Total No. of Questions DE M.Pharmacy (Pharmaceutics) (2017 Batch) (Sem -2) Total No of Pages 01 COMPUTER AIDED DRUG DELIVERY SYSTEM Subject Code MPH-203 Time: 3 Hrs. M. Code : 74963 INSTRUCTIONS TO CANDIDATES : Attempt any FIVE questions out of SIX questions Max Marks 75 Each question carries FIFTEEN marks a) Write the benefits of pharmaceutical automation in packaging. b) Explain the computational modelling concept with respect to drug absorption and
5 c) Differentiate Descriptive and Mechanistic modelling. a) Write about efflux transporters with suitable examples. 3 b) Describe the applications of computational fluid dynamics in pharmacy. Outline the quality by design concept in pharmaceutical product development with 3. respect to International conference on harmonization guidelines. a) Discuss the role of computers in pharmaceutical emulsions development. 15 7

b) "Why and how the innovative use of computer in R & D can be legal protected".
 5. Give an overview of artificial intelligence and its application in pharmaceuticals.
 15

Enumerate the history of computers in pharmaceutical research & development.

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May-2019

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Roll No. of Questions DE Roll No.

ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS (Sem-Z) M.Pharmacy (Pharmaceotics) (2017 Batch) Subject Code MPH-2027

74962 M.Code

Max Marks: 75

NSTRUCTIONS TO CANDIDATES Tiple: 3 Hrs.

Attempt any FIVE questions out of 81X questions.

get question carries FIFTEEN marks.

- paceass the various factors affecting drug absurption in vivo. Also claborate upon the verious active mechanisms for drug absorption,
- (2) Sectors pictinguish between tablets and capsules as a dosage form. Discuss the major associated for the drug release from each dosage form.
- (15) piscuss the compendia method of classification of desolution with respect to USP.
- 8 Emitterale one compartment model with respect to LV infusion.
- 6 Discuss with example cytochrone P450 based drug interaction.
- a) Write a note on biosimilar drag products. 10
- 600 b) What do you understand by binequivalence studies?
- Write a note on following: -6
- a) Monoclonal antibodies

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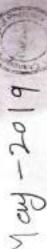
- 9 b) Vaccines
- c) Any commercialized drug products from biotechnology source.

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Roll No. Total No. of Questions : 06

Total No. of Pages: 01

M.Pharmacy (Pharmaceutics) (2017 Batch) (Sem.-2) MOLECULAR PHARMACEUTICS (NANO TECH AND TARGETED DDS)

Subject Code : MPH-201

M.Code: 74961

Time : 3 Hrs.

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(15)	Max. Ma	rks : 75
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QL	(b) What is EPR?	3
	(c) Enumerate six diseases heated by gene therapy.	3
	(d) Explain methods used for filling of aerosols.	3
	(e) Define Aquasomes.	3
Q2.	 (a) Discuss various viral carrier systems used in gene delivery. 	10
	(b) Define somatic gene therapy. Discuss different types of somatic gene therapy	
03.	(a) Discuss methods facilitating nasal absorption.	7
	(b) Explain quality control tests of aerosol formulations.	8
04.	(a) Discuss various polymers used in the preparation of nanoparticles.	10
	at a startity aspects of linosomes.	5
Q5.	(a) Explain the importance of cellular and lymphatic uptake in targeted in	ug delivery 10 5
	and across blood plant was not	100
	 (b) Discuss the factors affecting drug transport across electrons and appearance. (a) What are microspheres? Explain in detail methods of preparation and appearance. 	plications in 10
Q6.	(a) What are microspheres. drug delivery systems. (b) Discuss various components and their role in formation of niosomes.	5
	(b) Discuss various components and	ot on any
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May-2019

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51.0		M.Pharmacy (Pharmaceutics) (2017 Batch) (Sem. – 2) ECULAR PHARMACEUTICS (NANO TECH & TARGETE M Code: 74961 Subject Code: MPH-201	D DDS)
		Paper ID: (74964)	Marks: 75
			Marks
		JCTIONS TO CANDIDATES: s paper consists of SIX questions. Attempt any FIVE questions. h question carries FIFTEEN marks.	
	a)	Enumerate the principles of targeting drugs to tumors. Briefly discuss the approach for this purpose.	ne 'bacterial' (7.5)
		What are nano particles? Mention the limitations of using nano particles drugs to diseased tissues.	(7.5)
2	a)	Distinguish micro capsules from micro spheres. Give an account of the pol interaction method used for preparing microspheres.	ymer-polymer (7.5)
	b)	Give a brief account of Electrosomes and their applications.	(7.5)
3.	a)	and their advertiges 2 English at 400 years tomat of	f acrosols used (7.5)
	b)	Briefly describe the preparation of monoclonal antibodies.	(7.5)
w.	a)	Discuss gene therapy giving suitable example for cancer treatment.	(7.5)
	b)	Classify the products that can be used for intra nasal drug delivery, the application of intra nasal drug delivery for brain targeting.	Briefly discuss (7.5)
S	w	rite short notes on:	(5x3=15)
*		Viral gene transfer	
		Niososmes for drug targeting	
		Aptamers	(5x3=15
6	. C	ritically comment on:	(545.45
		Evaluation of liposomes	
	b	Evaluation of metered dose aerosols	
	c	Toxicity of nano particles	

M.Pharmacy (Pharmaceutics) (2017 Batch) (Sem. - 2) COSMETIC & COSMECEUTICS Subject Code: MPH-204 Paper ID: [74964] M Code: 74964

Time: 3 Hrs.

Max. Marks: 75

Attempt any FIVE questions out of total SIX. INSTRUCTIONS TO CANDIDATES:

Each question carries FIFTEEN marks.

<u>_</u>

1. a) Define Cosmetics.

ê

£ b) Differentiate between misbranded and spurious cosmetics.

6 3 c) Discuss the regulatory requirements regarding import of cosmetics in India. 2. a) Draw a neat labelled diagram of Skin depicting route of penetration also.

3 b) Discuss the structural changes take place in skin after wrinkles.

c) Discuss the care of face.

(15) 3. Discuss the role of surfactants in cosmaceuticals.

4. a) Discuss the formulation components of shampoo.

Discuss COSMOS guidelines with respect to manufacturing of cosmetios. b) Discuss SPF? Classify sunscreens with examples.

Discuss the challenges while formulating cosmetics.

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Total No. of Pages : 01

M.Pharmacy (Pharmaceutics) (2017 Batch) (Sem. - 2) COMPUTER AIDED DRUG DELIVERY SYSTEM

M Code: 74963 Subject Code: MPH-203 Paper ID: [74963]

Time : 3 Hrs.

Max. Marks: 75

INSTRUCTION TO CANDIDATES:

- Attempt any FIVE questions from total SIX.
- 2. All questions carry equal, FIFTEEN marks.
- 1. B) Detail the history of computers in pharmaceutical research and development.
 - b) Provide the ICHQ8 guidelines.

(8,7)

- a) What are transporters? Give its significance.
 - b) Explain P-gp and hPEPT1 Transporters.

(8, 7)

- a) What is optimization? Explain factorial design with at least one example.
 - Explain the use of optimization designs in the preparation of emulsion.
- a) What is model construction? Explain parameter sensitivity analysis.
 - Explain computer simulation of in vitro data to pharmacokinetic predictions. (8,7)
- Write short note on:
 - a) Robotics
 - b) Artificial Intelligence

(5x3=15)

- c) Computational Fluid dynamics
- a) Enumerate utility of computers in clinical development. b) How biowaivers considerations influenced the use of computer.

(8, 7)